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(72) Inventors PETER MICHEL and SYED MUJAHID ALI ZAIDI

(19)

(54) JOINT STRUCTURE

(71) We, GKN SANKEY LIMITED, a British Company of Albert Street Works, Bilston, in the County of Stafford, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to a form of releasable joint structure. The invention has been developed for interconnecting members of plastics material but is applicable to the interconnection of members of other materials, such as metal, as will be described below.

It is known to have a joint structure in plastics material which comprises a headed stud on one part, the heat of the stud being frusto-conical and being arranged to be passed through an aperture in another part and which is normally smaller than the head. The head can, by virtue of its frusto-conical shape and the resilience of the plastics material be passed through the aperture whereupon it will expand to its normal size and interconnect the two parts together.

In order to mould such studs, however, it is necessary to have undercuts in the mould since the stem of the stud is of smaller-cross-sectional area than the head of the stud. This makes for difficulties in moulding and the stud has to be removed from the mould by pulling the head through an aperture of the size of the stem of the stud.

It is an object of the invention to provide a joint structure which, if made in plastics material, can be made without the use of undercuts as described. As mentioned above, however, the joint structure is also applicable to members of materials other than plastics material.

According to the invention we provide the combination of a first and second members capable of being interconnected by a joint structure formed on the members and which comprises: on the first member; first and second channels and a projection, the channels extending depthwise away from a common edge substantially at right angles to one another and the wall of the second channel remote from said edge constituting the projection: and, on the second member; first and second projections extending heightwise substantially at right angles from a junction and a channel between the second projection and an adjacent part of the member; the projections and channels being arranged and dimensioned so that when the members are interconnected the first and second projections are received in the first and second channels with the common edge adjacent to said junction and the projection on the first member is received in the channel in the second member; the base at least of the second channel being resilient whereby the joint structure can be engaged by relative movement of the members in a direction parallel to the depth of the first channel which movement causes deflection of the base of the second channel to allow the second projection to pass over the projection on the first member so as to come into alignment with the second channel whereupon said base returns to its undeflected position causing the projection on the first member to engage in the channel in the second member and the second projection to engage in the second channel, said movement having been accompanied by engagement of the first projection in the first channel.

If the members are to be formed from plastics material the projections and channel on the seond member can be formed without the use of movable cores while the channels on the first member will require the use of a movable side core, since the channels are at right angles, but it will not be necessary to have any undercuts.

The surface of the projection on the first member which engages the second projection is preferably radiused so that as a result of said movement the base of the second channel is deflected to allow the projection on the first member to pass over the second projection easily as a result of said movement.

Preferably, the projections and channels are so arranged that the first projection is received in the first channel before the second projection engages the projection on the first member during movement to engage the channels and projections.

The joint structure may be provided continuously along edges of the two members to be interconnected. In such a case, however, endwise movement, i.e. movement of the members relative to one another parallel to the length of the channels and projections may be permitted unless there is some other means for preventing such movement. Such movement can be prevented, if desired, by having the joint structure at a number of spaced positions along the edges to be interconnected, the configuration of the edges between the parts of the joint structure being such as to prevent such endwise movement.

Preferably, the members are made from plastics material and useful materials are polypropylene, nylon, ABS,. and polyviyni chloride. The parts could aslso be made of, for example, hard rubber or even of ferrous or non-ferrous metal so long as there is sufficient resilience to enable the channels and projections to be releasably interconnected, that is to say the base at least of the second channel must be sufficiently resilient to allow the second projection and the projection on the first member to pass over one another.

The invention will now be described in detail by way of example with reference to the accompanying drawings in which:

FIGURE 1 is a section through two members formed with channels and projections constituting the joint structure of the invention showing the members with the joint partly engaged; and

FIGURE 2 is a view similar to Figure 1 but showing the joint structure parts fully engaged.

Referring now to the drawings a first member is indicated generally at 10 and a second member at 11. The members are moulded for example, from polypropylene.

The first member 10 has formed, in an edge thereof, a first channel 12 and a second channel 13. It will be seen that the channels are at right angles to one another, that is to say lines perpendicular to the bases of the channels are at right angles. The channels extend at right angles from a common edge 14. It will be noted that the wall 15 of the channel 12 does not extend to the left in the drawing past the wall 16 of the channel 13.

The wall 17 of the channel 13 provides a projection and this projections is formed by that wall of the channel 13 which is opposite to the common edge 14. The corner of the projection remote from the mouth of the channel 13 is radiused as indicated at 18.

The second member 11 has a first projection 19, a second projection 20 and a channel 21 between the second projection 20 and the adjacent part 22 of the member. The projections extend at right angles from a junction 19*a*.

The members are interengaged by engaging the free end portion of the first projection 19 in the mouth of the first channel 12 and then moving the member 11 in the direction of the arrow 23 in Figure 1. The base 24 of the second channel 13 is resilient and as the member 11 is moved in the direction of the arrow 23 the base 24 is deflected and the radius 18 rides up the wall of the second projection 20 so as to allow the second projection 20 to pass the projection 17.

As the projections 17 and 20 pass one another, the second projection 20 comes into alignment with the second channel 13 and the projection 17 comes into alignment with the channel 21. When the projections 17 and 20 are fully past one another the resilience of the base 24 causes it to return to its undeflected position as shown in Figure 2 whereby the second projection 20 is received in the second channel 13 and the projection 17 is received in the channel 21 all as shown in Figure 2. During this movement of the part 11 in the direction of the arrow 23, the first projection 19 has advanced into the first channel 12.

Figure 2 shows the two members fully interconnected by the joint structure. It will be seen that the junction 19*a* is adjacent to the common edge 14.

It will be seen from Figure 2 that relative movement between the members 10 and 11 in directions parallel to the arrow 23 is prevented by engagement of the projections 17 and 20 in the channels 21 and 13 respecitvely and relative movement of the members 10 and 11 in directions parallel to the arrow 24 is prevented by engagement of the projection 19 in the channel 12.

As mentioned above, it is preferred that the members are formed of resilient plastics material. If they are so formed then the member 11 can be formed between mould parts where the direction of draw is parallel to the arrow 24 without the necessity for any movable cores. The member 10 may be moulded between mould parts where the direction of draw is parallel to the arrow 25 but in this case it will ne necessary to have a movable side core to form the channel 13. However, no undercuts are required.

It will be appreciated from the foregoing that the members may be formed of hard rubber as well as of plastics material. It is also possible to make the members of metal so long as the base 24 of the channel 13 is

sufficiently resilient to enable the projections 17 and 20 to pass over one another. The metal may be ferrous or non-ferrous, for example phosphor bronze or some light alloys.

It will be seen that the invention provides a joint structure which is particularly useful when the parts are made from plastics material but which is also applicable to members made from other materials. It will be appreciated that when the joint structure is complete as shown in Figure 2, it is possible that the members 10 and 11 could move relative to one another in directions perpendicular to the plane of the drawing. This can be prevented where the joint structure is to interconnect two edges by having portions of the edges constructed as shown in Figures 1 and 2 and other portions of the edges which are plain, the plain portions of the edges meeting, for example, on a line such as indicated at 26 in Figure 2 and thus preventing movement of the members perpendicular to the plane of the drawing.

WHAT WE CLAIM IS:—

1. A combination of first and second members capable of being interconnected by a joint structure formed on the members and which comprises: on the first member; first and second channels and a projection, the channels extending depthwise away from a common edge substantially at right angles to one another and the wall of the second channel remote from said edge constituting the projection: and, on the second member; first and second projections extending heightwise substantially at right angles from a junction and a channel between the second projection and an adjacent part of the member; the projections and channels being arranged and dimensioned so that when the members are interconnected the first and second projections are received in the first and second channels with the common edge adjacent to said junction and the projection on the first member is received in the channel in the second member; the base at least of the second channel being resilient whereby the joint structure can be engaged by relative movement of the members in a direction parallel to the depth of the first channel which movement causes deflection of the base of the second channel to allow the second projection to pass over the projection on the first member so as to come into alignment with the second channel whereupon said base returns to its undeflected position causing the projection on the first member to engage the channel in the second member and the second projection to engage in the second channel, said movement having been accompanied by engagement of the first projection in the first channel.

2. A combination according to Claim 1 wherein the surface of the projection on the first member which engages the second projection is radiused.

3. A combination according to Claim 1 or Claim 2 wherein the projections and channels are so arranged that the first projection is received in the first channel before the second projection engages the projection on the first member during movement to engage the channels and projections.

4. A combination according to any preceding claim wherein the joint structure is provided continuously along edges of the two members to be interconnected.

5. A combination according to any of Claims 1 to 3 wherein the joint structure is provided at a number of spaced positions along the edges to be interconnected, the configuration of the edges between the parts of the joint structure being such as to prevent relative movement of the members parallel to the lengths of the channels.

6. A combination according to any preceding claim in which the members are made of plastics material.

7. A combination substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

FORRESTER, KETLEY & CO.,
Chartered Patent Agents.
Rutland House, 148 Edmund Street,
Birmingham B3 2LD.
and
Forrester House,
52 Bounds Green Road,
London N11 2EY.

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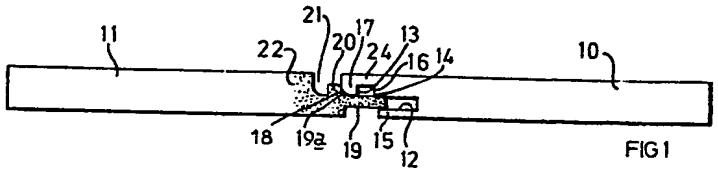

FIG 1

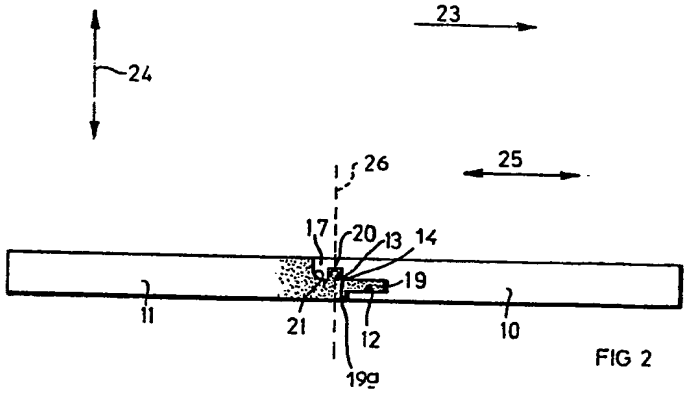

FIG 2